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TRANSIT ASSESSMENT DISTRICT COST STUDY

CITY AND COUNTY OF SAN FRANCISCO
OFFICE OF THE CITY ATTORNEY

RECOMMENDATIONS FOR RATE-SETTING PROCEDURES

Touche Ross & Co.

CONFIDENTIAL TO COUNSEL

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December 1, 1981

Touche Ross & Co.

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INTRODUCTION

Background

In May 1981, the Board of Supervisors passed, and the Mayor signed, legislation authorizing the City to establish special assessment districts to defray the cost of certain municipal services. Property owners within areas of San Francisco that benefit from significantly higher levels of service, compared with the rest of the City, may be assessed for the costs attributed to providing these special benefits.

In accordance with the provisions of this legislation, the City Attorney's Office requested Touche Ross & Co. to develop a methodology to estimate the net deficit for downtown transit service in San Francisco and to estimate that net deficit from presently available data. The net deficit will become the basis for an assessment fee per square foot of floor space charged to commercial property owners in the downtown area of the City.

Study Objectives

In conducting the study, we have sought to:

- Consider alternative approaches and recommend a single methodology for estimating the net deficit of downtown transit service; and

- Implement the recommended methodology as much as practicable with available data to estimate the net deficit for fiscal year 1980-81, the last fiscal year for which complete operating and financial data are available.

Our analysis of the net deficit for the San Francisco Municipal Railway (MUNI) involves six major steps:

- Allocation of annual operating costs to the downtown and non-downtown areas.

- Allocation of annual operating revenues and operating assistance grants to the two areas.

- Determination of the operating deficits for the two areas.

- Allocation of unfunded annual capital replacement requirements to the two areas.

- Determination of the annual net deficit for MUNI service to the downtown area based on relative levels of service to the downtown and nondowntown areas.
- Apportionment of the net deficit as an assessment fee among eligible property owners within the downtown area.

Exhibit 1 summarizes the major steps of the recommended methodology and how they lead to the desired result.

The Downtown District

Exhibit 2 illustrates the Downtown District defined to divide the City into downtown and non-downtown areas for purposes of estimating the net deficit. District boundaries are based on an independent study of benefits by Gruen Gruen + Associates. Details of their methodology can be found in their report, "Special Benefit of MUNI to Downtown San Francisco," dated September 1981.

Our estimation of the net deficit from available data is based on these boundaries as recommended by Gruen Gruen + Associates. Should these be modified prior to enactment of assessment district legislation, the estimated net deficit could change by a material amount and would have to be recalculated.

Organization of the Report

To describe the methodology we have recommended, this report is organized into sections for each of the six analytical areas concerned:

- Analysis of Operating Costs
- Analysis of Operating Revenues
- Determination of Operating Deficits
- Analysis of Capital Costs
- Determination of the Net Deficit
- Assessment of the Fee

EXHIBIT 1

SUMMARY METHODOLOGY FOR DETERMINAION OF THE NET DEFICIT FOR THE DOWNTOWN DISTRICT

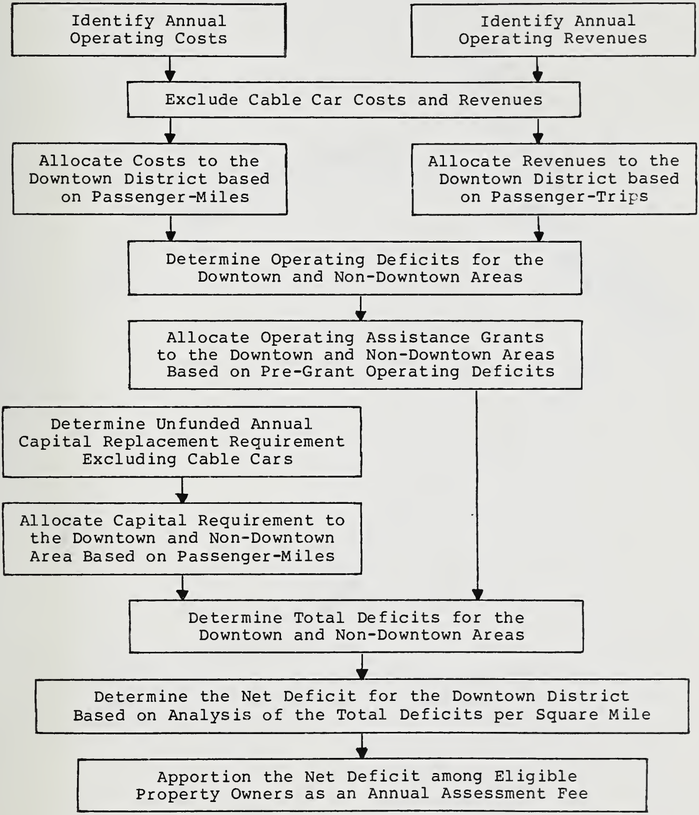
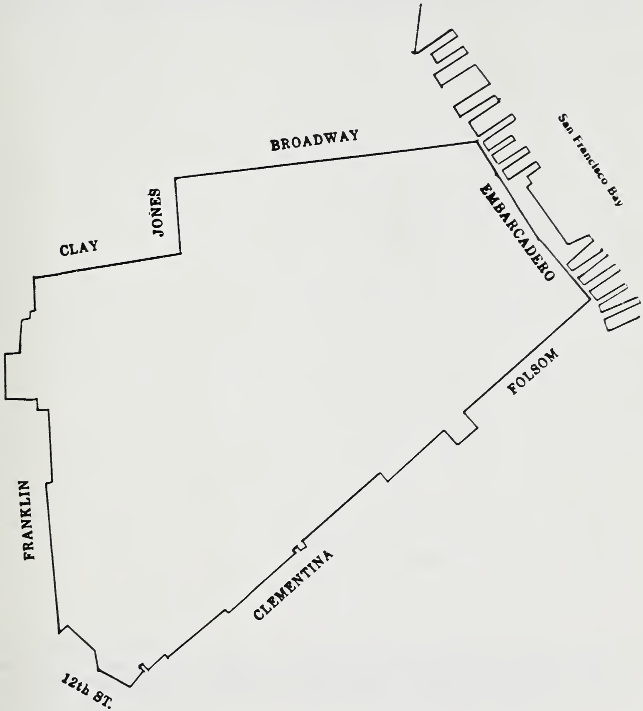

Identify Annual Operating Costs
Identify Annual Operating Revenues
Exclude Cable Car Costs and Revenues
Allocate Costs to the Downtown District based on Passenger-Miles
Allocate Revenues to the Downtown District based on Passenger-Trips
Determine Operating Deficits for the Downtown and Non-Downtown Areas
Allocate Operating Assistance Grants to the Downtown and Non-Downtown Areas Based on Pre-Grant Operating Deficits
Determine Unfunded Annual Capital Replacement Requirement Excluding Cable Cars
Allocate Capital Requirement to the Downtown and Non-Downtown Area Based on Passenger-Miles
Determine Total Deficits for the Downtown and Non-Downtown Areas
Determine the Net Deficit for the Downtown District Based on Analysis of the Total Deficits per Square Mile
Apportion the Net Deficit among Eligible Property Owners as an Annual Assessment Fee

EXHIBIT 2

GEOGRAPHIC BOUNDARIES OF THE DOWNTOWN DISTRICT



For each area of analysis, general formulas outlining that portion of the methodology are listed. The underlying rationale is then described to more fully explain the methodology. Finally, the relevant portion of our estimate of the fiscal year 1981-82 net deficit based on data for fiscal year 1980-81 is summarized to illustrate the application of the methodology as far as practicable with available data.*

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* A detailed description of our estimation of the net deficit based on fiscal year 1980-81 data is documented in the report Transit Assessment District Cost Study, "Determination of Net Deficit for Downtown Transit Service for Fiscal Year 1981-82," dated October 1, 1981.

ANALYSIS OF OPERATING COSTS

Allocation of annual operating costs to the downtown and non-downtown areas is outlined by the following formulas:

Step Number	Formula	Explanation
1	(1) - (2) = 3	Annual operating costs of MUNI service for last complete fiscal year (1) - Cable car operating costs (2) = Operating costs minus cable car costs (3)
2	(3) x (4) = 5	Operating costs minus cable car costs (3) x Percentage of total vehicle hours on feeder lines (4) = Feeder line operating costs (5)
3	(3) x (6) = (7)	Operating costs minus cable car costs (3) x Percentage of total vehicle hours on radial lines (6) = Radial line operating costs (7)
4	(5) x (8) = (9)	Feeder line operating costs (5) x Percentage of total feeder line passenger miles travelled on passengers trips into, out of, and within the Downtown District (8) = Feeder line costs allocable to District (9)
5	(7) x (10) = (11)	Radial line operating costs (7) x Percentage of passenger miles travelled on passenger trips into, out of, and within the Downtown District by passengers on radial lines (10) = Radial line costs allocable to District (11)
6	(9) + (11) = (12)	Feeder line costs allocable to District (9) + Radial line costs allocable to District (11) = District share of operating costs (12)

Operating costs are incurred to provide vehicle service to the public, maintenance of vehicles, maintenance of facilities and a wide variety of necessary support and administrative functions. Vehicle service is provided through five transit modes - street cars, cable cars, trolley coaches, motor coaches and light rail vehicles. For a variety of analytical and legal reasons, costs and revenues to operate the cable car system must be excluded from this assessment fee. Until certain provisions of the City Charter are modified, we have been advised that no assessment may be levied to defray the cable car deficit. Therefore, operating costs as well as operating revenues and capital costs for cable cars are excluded from this analysis. The formula of Step 1 excludes cable car operating costs before further analysis is made.

Allocation of operating costs to the downtown area is based on the share of downtown-related passenger utilization of the transit service provided. Costs are incurred directly or indirectly to provide vehicle hours of service. As a result, operating costs are largely determined by the scheduled service rather than by passenger utilization. However, the underlying basis for an assessment fee is the net deficit incurred to provide a benefit to a specific area, the Downtown District. That benefit consists of transporting passengers to, from or entirely within the Downtown District. Therefore, allocation of operating costs to the downtown area must be based on the relative share of service utilization by downtown-related passengers. The best measure of that service utilization is the share of passenger-miles accumulated by passengers riding to, from or entirely within the Downtown District.

Such passenger-miles are accumulated throughout the City on both feeder and radial lines. Feeder lines are those routes which do not enter the Downtown District but which link at transfer stops to radial lines which do. Therefore, operating costs are first allocated between feeder and radial lines based on their respective shares of total vehicle hours (Steps 2 and 3). Then, feeder and radial line operating costs are allocated to the Downtown District on the basis of passenger-miles accumulated on each type of line by passengers travelling to, from or entirely within the district (Steps 4 and 5). Finally, the district-related shares of feeder and radial line operating costs are added to result in the total annual operating costs for downtown transit service (Step 6).

For fiscal year 1980-81, we have estimated the annual operating costs for downtown transit service. These results are shown in Exhibit 3. For this analysis, we have made two modifications to the recommended methodology in light of restrictions imposed by presently available data. First, current ridership sampling to determine total and downtown passenger-miles is random

EXHIBIT 3

ALLOCATION OF OPERATING COSTS TO THE DOWNTOWN DISTRICT FOR FISCAL YEAR 1980-81

	Street Car	Trolley Coach	Motor Coach	Light Rail Vehicle	Total
Total Operating Costs	$6,060,998	$30,661,699	$62,702,786	$14,871,569	$114,297,052
Feeder Line Share of Total Vehicle Hours	0.0%	13.6%	30.2%	0.0%	21.6%
Feeder Line Costs	-0-	4,156,619	18,952,660	-0-	23,109,279
Radial Line Costs	$6,060,998	$26,505,080	$43,750,126	$14,871,569	$ 91,187,773
Downtown Share of Radial Line Passenger-Miles	70.808%	68.404%	70.909%	69.849%	70.001%
Downtown Share of Operating Costs	$4,291,671	$18,130,535	$31,022,777	$10,387,642	$ 63,832,625
Non-Downtown Share of Operating Costs	$1,769,327	$12,531,164	$31,680,009	$ 4,483,927	$ 50,464,427

within each of the four transit modes (cable cars excluded) but not across the modes.* Therefore, we have first allocated costs to mode and then to the Downtown District.

In addition, current ridership data exists solely in the form of the number of boardings and deboardings at each vehicle-stop. These data are inadequate to quantify the extent of passenger transfers between feeder and radial lines. As a result, passenger-miles accumulated on feeder lines by downtown-related passengers cannot be estimated. Therefore, no share of feeder line operating costs can be attributed to the Downtown District. For our analysis of fiscal year 1980-81, we have conservatively allocated all feeder line operating costs to the non-downtown area.

For future calculations of the net deficit, we recommend that ridership sampling be conducted on a random basis across modes to eliminate the need to allocate costs to mode. In addition, we suggest that passenger surveys be designed and conducted to quantify the transfer effect between radial and feeder lines for downtown passengers. In that event, an appropriate share of feeder line operating costs can then be allocated to the Downtown District.

Also in our analysis of fiscal year 1980-81 operating costs, a significant share of payroll expenditures had to be allocated by special means to cost centers and then to mode. This was necessary to adjust for the fact that a significant number of individuals paid under one cost center actually work in another. Such a circumstance arises through the lack of adequate controls over the reporting of payroll expenditures against assigned activities or cost centers. For our analysis of the assessment fee, we reduced the impact of these uncertainties based on interviews with cost center managers or allocation of uncertain payroll costs among modes on a broad basis to minimize overall error.

Payroll cost reporting for an organization and operation as diverse as MUNI's is always a complex problem. We have not conducted an overall review of payroll accounting methods or the range of problems encountered. We recommend that such a review be made, however. With payroll expenses over one-half of MUNI's total operating costs, the value of more specific and accurate cost reporting to the PUC and MUNI management is significant. Even if modal allocation of costs were to become unnecessary in future rate-setting for the assessment fee, better payroll cost accounting could aid management in achieving more effective and efficient operations.

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* Detailed description of the available ridership data and the sampling basis is presented in our previously referenced report.

Finally, electricity costs are presently billed to the MUNI and the PUC by the Bureau of Light, Heat and Power at rates well below those charged by PG&E. These discounted rates reflect billings at cost for electric power generated by the City-owned Hetch Hetchy Project. Electric costs for MUNI and the PUC are reported and allocated at these discounted rates. If the City were to adopt a policy of recovering market value for electric power consumption, then MUNI and PUC costs for electricity should be reported and allocated on the basis of PG&E rates. The 1980-81 analysis reflects the current policy of using discounted rates.

ANALYSIS OF OPERATING REVENUES

Allocation of annual operating revenues to the downtown and non-downtown areas is outlined by the following formulas:

Step Number	Formula	Explanation
7	(13) - (14) = (15)	Operating revenues for the last complete fiscal year (fares, advertising, and other revenues resulting from operations) (13) - Cable car operating revenues (14) = Non-cable car operating revenues (15)
8	(15) x (16) = (17)	Non-cable car operating revenues (15) x Percentage of passenger trips made on feeder lines (16) = Feeder line operating revenues (17)
9	(15) x (18) = (19)	Non-cable car operating revenues (15) x Percentage of passenger trips made on radial lines (18) = Radial line operating revenues (19)
10	(19) x (20) = (21)	Radial line operating revenues (19) x Percentage of passenger trips on radial lines into, out of, and within District (20) = Radial line operating revenue allocable to District (21)
11	(19) x (22) = (23)	Radial line operating revenues (19) x Percentage of passenger trips outside District (22) = Radial line operating revenue allocable outside District (23)
12	(17) x (24) = (25)	Feeder line operating revenues (17) x Percentage of total feeder line passenger trips transferring to or from the District (24) = Feeder line operating revenues allocable to District (25)

Step Number	Formula	Explanation
13	(17) x (26) = (27)	Feeder line operating revenues (17) x Percentage of total feeder line passenger trips which do not transfer to or from the District (26) = Feeder line operating revenues allocable outside District (27)
14	(21) + (25) = (28)	Radial line operating revenue allocable to District (21) + Feeder line operating revenue allocable to District (25) = Operating revenue allocable to District (28)
15	(23) + (27) = (29)	Radial line operating revenue allocable outside District (23) + Feeder line operating revenue allocable outside District (27) = Operating revenue allocable outside District (29)

Operating revenues result from a variety of sources - direct cash fare receipts, other indirect fare receipts such as Fast Passes, advertising and other miscellaneous sources. These are dominated by cash and Fast Pass fare revenues. As a result, operating revenues can be expected to vary almost directly with passenger utilization. Since these revenues are received or acknowledged at each passenger-boarding, the best measure to allocate operating revenues between the downtown and non-downtown areas is the relative share of passenger-trips related to each area.

Ideally, we would like this basis to be the number of linked passenger-trips where the multiple boardings of one passenger completing a single trip from origin to destination via vehicle transfers are counted as a single, linked passenger-trip. However, data to quantify system-wide transfer patterns are unavailable. We can count every boarding or, equivalently, every deboarding as a single unlinked passenger-trip. Based on the extensive distribution of routes and travel patterns by passengers throughout the City, it is reasonable to assume that transfer activity is also broadly distributed. Therefore, the shares of unlinked passenger-trips between the downtown and non-downtown areas are used as approximations for the shares of linked passenger-trips.

As with operating costs, we must first exclude cable car revenues and allocate the remaining operating revenues between feeder and radial lines. We can then use the relative shares of downtown-related passenger trips on feeder and radial lines to allocate portions their respective shares of operating revenues to the Downtown District. The result is a division of operating revenues between the downtown and non-downtown areas.

This methodology is accomplished in nine analytical steps. The formula of Step 7 excludes cable car revenues from further consideration. Steps 8 and 9 split the remaining operating revenues between feeder and radial lines on the basis of their respective shares of passenger-trips. Steps 10 and 11 divide revenues on radial lines between the downtown and non-downtown areas. Likewise, Steps 12 and 13 divide feeder line revenues between the two areas. Finally, downtown-related revenues for feeder and radial lines are added in Step 14 while non-downtown revenues for feeder and radial lines are combined in Step 15. Thus, operating revenues are fully divided between the two areas.

Just as with operating costs, we have estimated this division of operating revenues for fiscal year 1980-81. Again, it is necessary to first allocate revenues to transit mode since the ridership data is random within mode but not across mode. In addition, we cannot determine a share of feeder line revenues for downtown-related usage since the extent of transfers by passengers cannot presently be quantified. As a result, all feeder line revenues have been conservatively allocated to the non-downtown area as were feeder line costs. The results of this fiscal year 1980-81 estimate for operating revenue allocation to the downtown and non-downtown areas are shown in Exhibit 4.

For future calculations of the net deficit, our previous recommendation to randomize ridership surveys across modes can also eliminate the need to allocate revenues to mode. Our earlier recommendation that passenger surveys be designed and conducted to quantify the transfer effect between radial and feeder lines for downtown passengers will also permit a share of feeder line operating revenues to be allocated to the downtown.

Lastly, we suggest that surveys be conducted to determine the relative use of different types of fares by downtown versus non-downtown passengers. At present, we have divided all combined operating revenues by the overall shares of downtown and non-downtown passenger-trips. Refinement of this method by individually allocating revenues for each type of fare could be a better approximation if downtown passengers, many of whom are regular commuters, tend to use Fast Passes to a greater degree than non-downtown passengers.

EXHIBIT 4

ALLOCATION OF OPERATING REVENUES TO THE DOWNTOWN DISTRICT FOR FISCAL YEAR 1980-81

	Street Car	Trolley Coach	Motor Coach	Light Rail Vehicle	Total
Operating Revenues	$1,706,923	$13,887,411	$21,882,532	$4,927,958	$42,404,824
Feeder Line Share of Passenger-Trips	0.00%	5.37%	27.14%	0.00%	N/A
Feeder Line Revenues	$ -0-	$ 745,100	$ 5,939,414	$ -0-	$ 6,684,514
Radial Line Revenues	$1,706,923	$13,142,311	$15,943,118	$4,927,958	$35,720,310
Downtown Share of Radial Line Passenger-Trips	73.105%	68.994%	68.755%	66.745%	68.774%
Downtown Share of Operating Revenues	$1,247,846	$ 9,067,406	$10,961,691	$3,289,166	$24,566,109
Non-Downtown Share of Operating Revenues	$ 459,077	$ 4,820,005	$10,920,841	$1,638,792	$17,838,715

The PUC staff currently estimates that the average revenue per passenger-trip for a Fast Pass user is significantly less than that for a cash fare. At present, we have treated revenue per passenger-trip as being uniform. Therefore, if downtown passengers use Fast Passes more than non-downtown passengers, operating revenue allocation to the Downtown District is currently overstated and results in an understated downtown deficit or a conservative net deficit.

DETERMINATION OF OPERATING DEFICITS

From the allocation of operating costs and revenues between the downtown and non-downtown areas, we must next determine the operating deficits for both areas. For this purpose, federal, state and local operating assistance grants must also be allocated between the two areas as additional sources of revenue. The following formulas outline the methodology which results in operating deficits for the downtown and non-downtown areas of the City:

Step Number	Formula	Explanation
16	(3) - (12) = (30)	Operating costs minus cable car costs (3) - District share of operating costs (12) = Outside District share of operating costs (30)
17	(12) - (28) = (31)	District share of operating costs (12) - Operating revenue allocable to District (28) = District pre-grant deficit (31)
18	(30) - (29) = (32)	Outside District share of operating costs (30) - Operating revenue allocable to outside District (29) = Outside District pre-grant deficit (32)
19	(2) - (14) = (33)	Cable car operating costs (2) - Cable car operating revenues (14) = Cable car pre-grant deficit (33)
20	(31) + (32) + (33) = (34)	District pre-grant deficit (31) + Outside District pre-grant deficit (32) + Cable car pre-grant deficit (33) = Total pre-grant operating deficit (34)
21	(31) ÷ (34) = (35)	District pre-grant deficit (31 ÷ Total pre-grant operating deficit (34) = District share of pre-grant deficit (35)

Step Number	Formula	Explanation
22	(32) ÷ (34) = (36)	Outside District pre-grant deficit (32) ÷ Total pre-grant operating deficit (34) = Outside District share of pre-grant deficit (36)
23	(35) x (37) = (38)	District share of pre-grant deficit (35) x Operating assistance (37)* = Operating assistance allocable to District (38)
24	(36) x (37) = (39)	Outside District share of pre-grant deficit (36) x Operating assistance (37) = Operating assistance allocable to outside District (39)
25	(31) - (38) = (40)	District pre-grant deficit (31) - Operating assistance allocable to District (38) = Operating deficit of District (40)
26	(32) - (39) = (41)	Outside District pre-grant deficit (32) - Operating assistance allocable to outside District (39) = Operating deficit outside District (41)

The full operating deficits for the downtown and non-downtown areas are based on the difference between operating costs and revenues for each area as further reduced by a share of operating assistance grants for each area. Allocation of operating assistance grants between the two areas is based on the size of the pre-grant operating deficit (operating costs - operating revenues) for each area. As in the analyses of operating costs and revenues, a share of operating assistance grants is excluded for the cable car system. Exclusion is based on the cable car share of the MUNI pre-grant deficit.

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* Federal, state and local operating assistance.

The first three steps of our recommended methodology determine the pre-grant deficits for the downtown and non-downtown areas based on earlier allocations of operating costs and revenues. Step 16 simply completes the determination of non-downtown operating costs begun by Steps 1 through 7 and demonstrated for fiscal year 1980-81 in Exhibit 3. Steps 17 and 18 then simply subtract operating revenues from operating costs for each area to determine their respective pre-grant deficits.

The next six steps are designed to eliminate the cable car share of operating assistance grants and to allocate the remainder between the downtown and non-downtown areas. Step 19 calculates the cable car pre-grant deficit, and Step 20 adds it to the downtown and non-downtown pre-grant deficits to determine a total MUNI pre-grant deficit. Then, Steps 21 and 22 divide the downtown and non-downtown pre-grant deficits by the total MUNI pre-grant deficit to result in the shares of the MUNI pre-grant deficit for each area, respectively. Finally, Steps 23 and 24 multiply the total annual operating assistance received by MUNI times these relative shares to allocate operating assistance grants between the downtown and non-downtown areas.

The last portion of the recommended methodology subtracts these amounts of operating assistance grants for each area from the downtown and non-downtown pre-grant deficits as further sources of revenue. This is done in Steps 25 and 26 to result in full operating deficits for each area.

Estimation of the full operating deficits in fiscal year 1980-81 for the downtown and non-downtown areas can be accomplished as described above. No added or improved data are required for this stage of the methodology. The results of this analysis are outlined in Exhibit 5.

EXHIBIT 5

DETERMINATION OF OPERATING DEFICITS FOR THE DOWNTOWN AND NON-DOWNTOWN AREAS FOR FISCAL YEAR 1980-81*

	Downtown	Non-Downtown	Total
Operating Costs			
● Radial Lines	$63,832,625	$27,355,148	$ 91,187,773
● Feeder Lines	-0-	23,109,279	23,109,279
Subtotal	63,832,625	50,464,427	114,297,052
Local Revenues			
● Radial Lines	24,566,109	11,154,201	35,720,310
● Feeder Lines	-0-	6,684,514	6,684,514
Subtotal	24,566,109	17,838,715	42,404,824
Pre-Grant Deficit	39,266,516	32,625,712	71,892,228
Share of Pre-Grant Deficit, Percent	54.619%	45.381%	100.0%
Operating Assistance Grants	17,626,609	14,645,574	32,272,183
Operating Deficits	$21,639,907	$17,980,138	$ 39,620,045

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* Operating costs and revenues as well as operating assistance grants for the cable car system have been excluded per the described methodology.

ANALYSIS OF CAPITAL COSTS

Provision for expenditures to replace existing capital assets as they reach the end of their useful lives must be made in order to sustain a current level of service to the Downtown District. To the extent that annual capital replacement requirements are not met by grant-funded expenditures, a capital deficit must also be allocated between the downtown and non-downtown areas and added to their respective operating deficits. Subsequent determination of the net deficit then provides for recovery of all unrecovered costs necessary to continue mass transit service to the Downtown District.

For this purpose, the following formulas outline an analysis of capital costs:

Step Number	Formula	Explanation
27	(42) ÷ (43) = (44)	Current replacement cost for end of year existing assets for last complete fiscal year by asset category for all assets (42) ÷ Accounting record total useful life by asset category for all assets (43) = Annual capital replacement requirement by asset category for all assets (44)
28	(45) ÷ (46) = (47)	Replacement cost for asset replacements during last complete fiscal year (46) ÷ Replacement cost for total asset purchases during last complete fiscal year (46) = Replacement percentage of San Francisco Municipal Railway Improvement Corporation (SFMRIC) interest income (47)
29	(47) x (48) = (49)	Replacement percentage of SFMRIC interest income (47) x Total interest income (48) = Replacement share of SFMRIC interest income (49)

Step Number	Formula	Explanation
30	(50) - (51) - (52) = (53)	Total annual capital grants expended (50) - Annual capital grants expended for cable cars (51) - Annual capital grants expended for expansion assets (52) = Local, state and federal grants expended annually for capital replacement (53)
31	(44) - (53) - (49) = (54)	Annual capital replacement requirement by asset category for all assets (44) - Local state and federal grants expended annually for capital replacement (53) - Replacement share of SFMRIC income (49) = Unfunded share of annual capital replacement requirement (54)
32	(55) ÷ (56) = (57)	Passenger miles travelled on passenger trips into, out of, and within the District (55) ÷ Total passenger miles travelled on all passenger trips (56) = Percentage of unfunded share of annual capital replacement requirements allocable to District (57)
33	(57) x (54) = (58)	Percentage of unfunded share of annual capital replacement requirement allocable to District (57) x Unfunded share of annual capital replacement requirement (54) = Unfunded share of annual capital replacement requirement allocable to District (58)
34	(54) - (58) = (59)	Unfunded share of annual capital replacement requirement (54) - Unfunded share of annual capital replacement requirement allocable to District (58) = Unfunded share of annual capital replacement requirement allocable to outside District (59)

A current annual capital replacement requirement must be based on the depreciable portion of current replacement cost for existing assets divided by their accounting useful lines. Current replacement costs are estimated based on current market value for comparable new assets or on historical purchase prices of existing assets inflated to the present using an appropriate producer price index for each asset category. The depreciable share of these current replacement costs is based on the historical accounting records for each asset category. Step 27 of the methodology summarizes this process for all transit assets in use at the end of the last complete fiscal year. In this way, assets recently acquired to expand or improve service that are part of the existing service base are also included in calculating subsequent replacement needs.

An annual capital replacement requirement is calculated as if capital expenditures occur on a relatively continuous basis. In fact, assets are replaced at periodic intervals. As a result, it is possible that for the years between major capital replacement purchases, an apparent unfunded capital requirement may be calculated. Such a result would cause fees to be collected in advance of their need. For this reason, credit for interest income on all capital balances held by the San Francisco Municipal Railway Improvement Corporation (SFMRIC) must be allowed to the extent such income defrays unfunded capital expenditures for asset replacement.

The share of SFMRIC interest income to be credited against the annual capital replacement requirement is based on the relative shares of capital purchases for the purposes of expansion versus replacement of assets during the last complete fiscal year. Steps 28 and 29 calculate the replacement share of SFMRIC interest income to be credited against the annual capital replacement requirement.

Classification of asset purchases for the purpose of expansion or replacement can be accomplished in several ways. First, asset acquisitions and retirements during the last complete fiscal year could be matched against each other to determine those purchases which serve as replacements. Any unmatched purchases would be classified as expansion assets. This approach suffers in two ways. Acquisition of replacing assets and retirement of replaced assets may not occur in the same year. In addition, replacing assets may be of a different type than the replaced assets. For both reasons, simple matching of asset acquisitions and retirements may be impossible or misleading.

Another way to classify asset purchases could be based on historical patterns for asset replacement and expansion over a period longer than one year. This method suffers from past constraints on asset purchases imposed by lack of needed funds. Projections of such past patterns onto the present would simply continue to handicap transit operations. In addition, development of historical patterns for replacement versus expansion would also be complicated by continuing changes in the nature of acquired assets.

Therefore, we recommend a third way to classify asset purchases for the purpose of replacement or expansion. We believe the most realistic basis to segregate asset purchases is by intent. MUNI assets are acquired for the purpose of replacement or expansion. If assets are classified according to intent, the previous problems associated with the relative timing between acquisitions and retirements as well as the changing characteristics of transit assets are minimized. Determination of intent should be based on an analysis of published plans and budgets and internal working papers prepared by PUC staff.

Once capital expenditures have been classified according to replacement or expansion, then expenditure of capital grants for the purchase of specific assets can also be classified. The result is identification of annual grants expended annually for capital replacement as funding sources to be subtracted from the annual capital replacement requirement. Step 30 calculates grant spending for capital replacement by subtracting expenditures of all cable car capital grants and capital grants for expansion of other assets from the total annual capital grants expended. Step 31 then determines the unfunded share of the annual capital replacement requirement by subtracting both grant spending for capital replacement and the replacement share of SFMRIC interest income from the total annual capital replacement requirement.

The last portion of this capital analysis allocates the unfunded share of the annual capital replacement requirement between the downtown and non-downtown areas. Capacity utilization of the MUNI system by downtown passengers is the best measure for this purpose since assets are acquired to provide or support transit capacity. Therefore, the portion of annual passenger miles accumulated by downtown passengers can represent the downtown share of the unfunded annual capital replacement requirement. Steps 32 and 33 of the methodology accomplish this allocation. The non-downtown share is simply the difference between the total unfunded annual capital replacement requirement and the downtown share as is calculated in Step 34. The downtown and non-downtown shares of the unfunded annual capital replacement requirement are then ready to be added to the operating deficits for both areas to determine the total deficit of each area.

Estimation of the fiscal year 1980-81 unfunded annual capital replacement requirements for the downtown and non-downtown areas could only be partially completed. Presently available capital data are only sufficient to determine an annual capital replacement requirement. Present data are not complete enough to match expenditures of capital grants against asset acquisitions or to classify asset purchases for the purposes of expansion or replacement. Therefore, we have only calculated the annual capital replacement requirement from the total replacement costs for existing assets based on expected useful lifetimes as summarized in Exhibits 6 and 7.

In the future, the PUC must maintain additional capital records to document grant expenditures for specific purchases of assets as well as the purpose of asset purchases with regard to replacement versus expansion. To implement the full capital analysis for ultimate determination of the net deficit, full documentation by asset of the following data is recommended:

- Month and year of asset purchase
- Acquisition cost or purchase price
- Depreciable percentage, net of estimated salvage or resale value
- Producer price index for asset class
- Total useful life per accounting records
- Capital grant funding committed to asset purchase
- Purchase payment and grant expenditure schedule
- Assets replaced or intended to be replaced by acquired assets
- Transit modes supported by the acquired assets.

EXHIBIT 6

REPLACEMENT COSTS OF CAPITAL ASSETS[1] FOR FISCAL YEAR 1980-81

Assets	Street Car	Trolley Coach	Motor Coach	Light Rail Vehicle	Unallocated	Total
es[2]	$ 42,453,600	$63,186,750	$ 81,021,600	$90,071,190	$ 3,689,048	$280,422,188
e Related ipment	1,336,912	-0-	-0-	-0-	-0-	1,336,912
ities	58,166,104[3]	21,520,280	6,263	-0-	-0-	79,692,647
ings	55,710,298[3]	10,121,904	31,932,578	-0-	-0-	97,764,780
	-0-	-0-	-0-	-0-	-0-	-0-
Assets	3,368,160	584,898	1,171,989	-0-	3,756,909	8,881,956
subtotal	161,035,074	95,413,832	114,132,430	90,071,190	7,445,957	468,098,483
Hetchy ets	-0-	-0-	-0-	-0-	28,535,799	28,535,799
	$16,035,074	$95,413,832	$114,132,430	$90,071,190	$35,981,756	$496,634,282

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t of salvage value. MUNI assets up-to-date through March 31, 1981; Hetch Hetchy assets rough June 30, 1980.

	Street Car	Trolley Coach	Motor Coach	Light Rail Vehicle
mber of Vehicles	76	345	528	99
ice per Vehicles	$ 570,000	$ 185,000	$ 155,000	$ 919,000
tal Vehicle Replacement	43,320,000	63,825,000	81,840,000	90,981,000
tal Salvage Value	866,400	638,250	818,400	909,810
et Replacement Cost	$ 42,453,600	$63,186,750	$ 81,021,600	$90,071,190

ight rail vehicle (MUNI Metro) facilities and buildings included.

EXHIBIT 7

ANNUAL REPLACEMENT CHARGE FOR CAPITAL ASSETS FOR FISCAL YEAR 1980-81

ni Assets	Street Car	Trolley Coach	Motor Coach	Light Rail Vehicle	Unallocated	Total
cles*	$ 2,122,680	$ 7,898,344	$10,127,700	$ 3,002,373	$465,334	$23,616,431
cle Related uipment	71,571	-0-	-0-	-0-	-0-	71,571
lities	2,159,763	819,184	159	-0-	-0-	2,979,106
dings	1,313,007	300,862	757,901	-0-	-0-	2,371,770
	-0-	-0-	-0-	-0-	-0-	-0-
r Assets	218,493	42,495	97,936	-0-	471,173	830,097
subtotal	5,885,514	9,060,885	10,983,696	3,002,373	936,507	29,868,975
h Hetchy sets	-0-	-0-	-0-	-0-	589,430	589,430
l	$ 5,885,514	$ 9,060,885	$10,983,696	$ 3,002,373	$1,525,937	$30,458,405
otal Vehicle Replacement Cost	$42,453,600	$63,186,750	$81,021,600	$90,071,190		
Jseful Book Life (yrs)	20	8	8	30		
nnual Vehicle Replacement Charge (1 ÷ 2)	$ 2,122,680	$ 7,898,344	$10,127,700	$ 3,002,373		

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DETERMINATION OF THE NET DEFICIT

From the operating deficits and unfunded annual capital replacement requirements for the downtown and non-downtown areas, total deficits for each area can be calculated. However, the net deficit underlying the assessment fee must be based on the level of service to the Downtown District in excess of the level of service to the rest of the City. We determine the net deficit as the difference in the total deficits per square mile between the two areas multiplied times the land area of the downtown area.

Formulas for Steps 35 through 43 outline this procedure including methods to adjust the value of the net deficit calculated from data for the last complete fiscal year to a value representative of the current year of assessment. Such an adjustment is necessary because a two-year lag is expected between data of the last complete fiscal year and the current year of assessment resulting in potential for significant intervening inflation.

Step Number	Formula	Explanation
35	(40) + (58) = (60)	Operating deficit of District (40) + Unfunded share of annual capital replacement requirement allocable to District (58) = District deficit (60)
36	(60) + (61) = (62)	District deficit (60) + Annual District administration costs (61) = Total District deficit (62)
37	(41) + (59) = (63)	Operating deficit outside District (41) + Unfunded share of annual capital replacement requirement allocable to outside District (59) = Total deficit outside District (63)
38	(62) ÷ (64) = (65)	Total District deficit (62) ÷ Land area in District (64) = District deficit per square mile (65)

Step Number	Formula	Explanation
39	(63) ÷ (66) = (67)	Total deficit outside District (63) ÷ Land area outside district (66) = Deficit per square mile outside District (67)
40	(65) - (67) = (68)	District deficit per square mile (65) - Deficit per square mile outside District (67) = Excess District deficit per square mile (68)
41	(68) x (64) = (69)	Excess District deficit per square mile (68) x Land area in District (64) = Total net deficit chargeable to District based on last complete fiscal year (69)
42	(69) x (70) = (71)	Total net deficit chargeable to District based on last complete fiscal year (69) x Last complete fiscal year to budget year inflation factor (70) = Adjusted net deficit chargeable to District (71)
43	(71) ± (72) = (73)	Adjusted net deficit chargeable to District (71) ± Balance forward from last complete fiscal year* (72) = Current year net deficit chargeable to District (73)

Total deficits for both areas are calculated in Steps 35 through 37. Steps 35 and 36 combine the operating deficit and the unfunded annual capital replacement requirement for the downtown area as well as the annual assessment district administration costs to calculate the total downtown deficit. The operating deficit and unfunded annual capital replacement requirement for the non-downtown area are added in Step 37 to form the total non-downtown deficit.

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* Balance forward if adjustments made to deficit charged for last complete fiscal year.

The relative concentrations of these deficits and the net deficit for the last complete fiscal year are determined in Steps 38 through 41. Steps 38 and 39 divide the total deficits of each area by their respective land areas to determine deficits per square mile for each area. Step 40 calculates the difference between these deficits per square mile. Finally, Step 41 multiplies this difference by the land area of the Downtown District to determine the net deficit for the last complete fiscal year.

Steps 42 and 43 represent the adjustment process from the value of the net deficit calculated for the last complete fiscal year to a value for the current year of assessment. An inflation factor determined from the ratio of the MUNI budget deficit in the current year of assessment to the actual deficit for the last complete fiscal year is multiplied times the net deficit for the last complete fiscal year in Step 42. To the extent that the budgeted deficit for the current year of assessment is later found to differ from the realized deficit for that year, an adjustment will be required in the subsequent year of assessment. Step 43 outlines this process stated as a correction for assessments in previous years.

We have completed our demonstration of this methodology by estimating the net deficit for fiscal year 1980-81. Exhibit 8 shows this result which has been made conservative by omission of any capital deficit as well as full allocation of feeder line operating costs and revenues to the non-downtown area. No estimated inflation adjustment has been made because budgets for fiscal year 1982-83, the likely first year of assessment, have not yet been formulated.

EXHIBIT 8

CALCULATION OF THE NET DEFICIT FOR FISCAL YEAR 1980-81

	Downtown District	Non-Downtown Area	Total
Operating Deficit	$21,639,907	$17,980,138	$39,620,045
Capital Deficit	-0-	-0-	-0-
Total Deficit	$21,639,907	$17,980,138	$39,620,045
Land Area, Square Miles	2.074(*)	43.377(**)	
Deficit per Square Mile	$10,433,899	$ 414,509	
Excess Downtown Deficit per Square Mile:			$10,019,390
Total Net Deficit:			$20,780,215

(*) Determined by planimeter measurement of the Downtown District defined by Gruen Gruen + Associates on a 1978 1":800' scale map of San Francisco.

(**) Determined by subtracting the area of the Downtown District from the known area of 45.451 square miles for mainland San Francisco County.

ASSESSMENT OF THE FEE

The current-year net deficit as adjusted for inflation is assessed among commercial property owners on the basis of eligible square footage of the floor space in buildings within the Downtown District. Residential and publicly owned floor space in public use are excluded. In addition, we have been advised by the City to exclude first floor and basement floor space. The total remaining eligible floor space is divided into the current-year net deficit to determine the assessment fee per gross square foot. Each property owner within the Downtown District is then assessed at this rate on the basis of his total eligible floor space.

This methodology is outlined in the following formulas:

Step Number	Formula	Explanation
44	(74) - (75) - (76) = (77)	Total gross square feet of building space in District (74) - Residential gross square feet of building space in District (75) - Publicly owned gross square feet of building space in public use in District (76) = District gross square footage (77)
45	(77) - (78) = (79)	District gross square footage (77) - Total floor area on first floors and in basements in District (78) = District gross square footage to be assessed (79)
46	(73) ÷ (79) = (80)	Current year net deficit chargeable to District (73) ÷ District gross square footage to be assessed (79) = Assessment per gross square foot (80)
47	(81) - (82) - (83) = (84)	Total gross floor area** in a building (81) - Gross square feet of space on first floor in building (82) - Gross square feet of space in basement of building (83) = Floor area to be assessed (84)
48	(80) x (84) = (85)	Assessment per gross square foot (80) x Floor area to be assessed (84) = Total assessment for a building (85)

** Total gross floor area as defined in the FAR regulations, Section 102.8 of the City Planning Code, Article 1.

Touche Ross & Co. has not specifically evaluated this part of the methodology. Rather, our independent analysis and assessment of alternatives concluded with the calculation of the net deficit described above.

APPENDIX

SUMMARY OF FORMULAS

Step Number	Formula	Explanation
1	(1) - (2) = 3	Annual operating costs of MUNI service for last complete fiscal year (1) - Cable car operating costs (2) = Operating costs minus cable car costs (3)
2	(3) x (4) = 5	Operating costs minus cable car costs (3) x Percentage of total vehicle hours on feeder lines (4) = Feeder line operating costs (5)
3	(3) x (6) = (7)	Operating costs minus cable car costs (3) x Percentage of total vehicle hours on radial lines (6) = Radial line operating costs (7)
4	(5) x (8) = (9)	Feeder line operating costs (5) x Percentage of total feeder line passenger miles travelled on passengers trips into, out of, and within the Downtown District (8) = Feeder line costs allocable to District (9)
5	(7) x (10) = (11)	Radial line operating costs (7) x Percentage of passenger miles travelled on passenger trips into, out of, and within the Downtown District by passengers on radial lines (10) = Radial line costs allocable to District (11)
6	(9) + (11) = (12)	Feeder line costs allocable to District (9) + Radial line costs allocable to District (11) = District share of operating costs (12)

APPENDIX

SUMMARY OF FORMULAS
(Continued)

Step Number	Formula	Explanation
7	(13) - (14) = (15)	Operating revenues for the last complete fiscal year (fares, advertising, and other revenues resulting from operations) (13) - Cable car operating revenues (14) = Non-cable car operating revenues (15)
8	(15) x (16) = (17)	Non-cable car operating revenues (15) x Percentage of passenger trips made on feeder lines (16) = Feeder line operating revenues (17)
9	(15) x (18) = (19)	Non-cable car operating revenues (15) x Percentage of passenger trips made on radial lines (18) = Radial line operating revenues (19)
10	(19) x (20) = (21)	Radial line operating revenues (19) x Percentage of passenger trips on radial lines into, out of, and within District (20) = Radial line operating revenue allocable to District (21)
11	(19) x (22) = (23)	Radial line operating revenues (19) x Percentage of passenger trips outside District (22) = Radial line operating revenue allocable outside District (23)
12	(17) x (24) = (25)	Feeder line operating revenues (17) x Percentage of total feeder line passenger trips transferring to or from the District (24) = Feeder line operating revenues allocable to District (25)

APPENDIX

SUMMARY OF FORMULAS (Continued)

Step Number	Formula	Explanation
13	(17) x (26) = (27)	Feeder line operating revenues (17) x Percentage of total feeder line passenger trips which do not transfer to or from the District (26) = Feeder line operating revenues allocable outside District (27)
14	(21) + (25) = (28)	Radial line operating revenue allocable to District (21) + Feeder line operating revenue allocable to District (25) = Operating revenue allocable to District (28)
15	(23) + (27) = (29)	Radial line operating revenue allocable outside District (23) + Feeder line operating revenue allocable outside District (27) = Operating revenue allocable outside District (29)
16	(3) - (12) = (30)	Operating costs minus cable car costs (3) - District share of operating costs (12) = Outside District share of operating costs (30)
17	(12) - (28) = (31)	District share of operating costs (12) - Operating revenue allocable to District (28) = District pre-grant deficit (31)
18	(30) - (29) = (32)	Outside District share of operating costs (30) - Operating revenue allocable to outside District (29) = Outside District pre-grant deficit (32)

APPENDIX

SUMMARY OF FORMULAS
(Continued)

Step Number	Formula	Explanation
19	(2) - (14) = (33)	Cable car operating costs (2) - Cable car operating revenues (14) = Cable car pre-grant deficit (33)
20	(31) + (32) + (33) = (34)	District pre-grant deficit (31) + Outside District pre-grant deficit (32) + Cable car pre-grant deficit (33) = Total pre-grant operating deficit (34)
21	(31) ÷ (34) = (35)	District pre-grant deficit (31 ÷ Total pre-grant operating deficit (34) = District share of pre-grant deficit (35)
22	(32) ÷ (34) = (36)	Outside District pre-grant deficit (32) ÷ Total pre-grant operating deficit (34) = Outside District share of pre-grant deficit (36)
23	(35) x (37) = (38)	District share of pre-grant deficit (35) x Operating assistance (37)* = Operating assistance allocable to District (38)
24	(36) x (37) = (39)	Outside District share of pre-grant deficit (36) x Operating assistance (37) = Operating assistance allocable to outside District (39)
25	(31) - (38) = (40)	District pre-grant deficit (31) - Operating assistance allocable to District (38) = Operating deficit of District (40)
26	(32) - (39) = (41)	Outside District pre-grant deficit (32) - Operating assistance allocable to outside District (39) = Operating deficit outside District (41)

* Federal, state and local operating assistance.

APPENDIX

SUMMARY OF FORMULAS
(Continued)

Step Number	Formula	Explanation
27	(42) ÷ (43) = (44)	Current replacement cost for end of year existing assets for last complete fiscal year by asset category for all assets (42) ÷ Accounting record total useful life by asset category for all assets (43) = Annual capital replacement requirement by asset category for all assets (44)
28	(45) ÷ (46) = (47)	Replacement cost for asset replacements during last complete fiscal year (46) ÷ Replacement cost for total asset purchases during last complete fiscal year (46) = Replacement percentage of San Francisco Municipal Railway Improvement Corporation (SFMRIC) interest income (47)
29	(47) x (48) = (49)	Replacement percentage of SFMRIC interest income (47) x Total interest income (48) = Replacement share of SFMRIC interest income (49)
30	(50) - (51) - (52) = (53)	Total annual capital grants expended (50) - Annual capital grants expended for cable cars (51) - Annual capital grants expended for expansion assets (52) = Local, state and federal grants expended annually for capital replacement (53)
31	(44) - (53) - (49) = (54)	Annual capital replacement requirement by asset category for all assets (44) - Local state and federal grants expended annually for capital replacement (53) - Replacement share of SFMRIC income (49) = Unfunded share of annual capital replacement requirement (54)

APPENDIX

SUMMARY OF FORMULAS
(Continued)

Step Number	Formula	Explanation
32	(55) ÷ (56) = (57)	Passenger miles travelled on passenger trips into, out of, and within the District (55) ÷ Total passenger miles travelled on all passenger trips (56) = Percentage of unfunded share of annual capital replacement requirements allocable to District (57)
33	(57) x (54) = (58)	Percentage of unfunded share of annual capital replacement requirement allocable to District (57) x Unfunded share of annual capital replacement requirement (54) = Unfunded share of annual capital replacement requirement allocable to District (58)
34	(54) - (58) = (59)	Unfunded share of annual capital replacement requirement (54) - Unfunded share of annual capital replacement requirement allocable to District (58) = Unfunded share of annual capital replacement requirement allocable to outside District (59)
35	(40) + (58) = (60)	Operating deficit of District (40) + Unfunded share of annual capital replacement requirement allocable to District (58) = District deficit (60)
36	(60) + (61) = (62)	District deficit (60) + Annual District administration costs (61) = Total District deficit (62)
37	(41) + (59) = (63)	Operating deficit outside District (41) + Unfunded share of annual capital replacement requirement allocable to outside District (59) = Total deficit outside District (63)

APPENDIX

SUMMARY OF FORMULAS (Continued)

Step Number	Formula	Explanation
38	(62) ÷ (64) = (65)	Total District deficit (62) ÷ Land area in District (64) = District deficit per square mile (65)
39	(63) ÷ (66) = (67)	Total deficit outside District (63) ÷ Land area outside district (66) = Deficit per square mile outside District (67)
40	(65) - (67) = (68)	District deficit per square mile (65) - Deficit per square mile outside District (67) = Excess District deficit per square mile (68)
41	(68) x (64) = (69)	Excess District deficit per square mile (68) x Land area in District (64) = Total net deficit chargeable to District based on last complete fiscal year (69)
42	(69) x (70) = (71)	Total net deficit chargeable to District based on last complete fiscal year (69) x Last complete fiscal year to budget year inflation factor (70) = Adjusted net deficit chargeable to District (71)
43	(71) ± (72) = (73)	Adjusted net deficit chargeable to District (71) ± Balance forward from last complete fiscal year* (72) = Current year net deficit chargeable to District (73)

* Balance forward if adjustments made to deficit charged for last complete fiscal year.

APPENDIX

SUMMARY OF FORMULAS (Continued)

Step Number	Formula	Explanation
44	(74) - (75) - (76) = (77)	Total gross square feet of building space in District (74) - Residential gross square feet of building space in District (75) - Publicly owned gross square feet of building space in public use in District (76) = District gross square footage (77)
45	(77) - (78) = (79)	District gross square footage (77) - Total floor area on first floors and in basements in District (78) = District gross square footage to be assessed (79)
46	(73) ÷ (79) = (80)	Current year net deficit chargeable to District (73) ÷ District gross square footage to be assessed (79) = Assessment per gross square foot (80)
47	(81) - (82) - (83) = (84)	Total gross floor area** in a building (81) - Gross square feet of space on first floor in building (82) - Gross square feet of space in basement of building (83) = Floor area to be assessed (84)
48	(80) x (84) = (85)	Assessment per gross square foot (80) x Floor area to be assessed (84) = Total assessment for a building (85)

** Total gross floor area as defined in the FAR regulations, Section 102.8 of the City Planning Code, Article 1.